

Item		ASTM test method No.	Type 2–D
(i) Cetane Number		D613	40–50
(ii) Cetane Index		D976	40–50
(iii) Distillation range:			
(A) IBP	°F	D86	340–400
	(°C)		(171.1–204.4)
(B) 10 pct. point	°F	D86	400–460
	(°C)		(204.4–237.8)
(C) 50 pct. point	°F	D86	470–540
	(°C)		(243.3–282.2)
(D) 90 pct. point	°F	D86	560–630
	(°C)		(293.3–332.2)
(E) EP	°F	D86	610–690
	(°C)		(321.1–365.6)
(iv) Gravity	°API	D287	32–37
(v) Total sulfur	ppm	D2622	7–15
(vi) Hydrocarbon composition:			
(A) Aromatics, minimum (Remainder shall be paraffins, naphthenes, and olefins).	pct.	D5186	27
(vii) Flashpoint, min.	°F	D93	130
	(°C)		(54.4)
(viii) Viscosity	centistokes	D445	2.0–3.2

(3) Petroleum fuel for diesel vehicles meeting the following specifications, or substantially equivalent specifications approved by the Administrator, shall be used in service accumulation. The grade of petroleum diesel fuel rec-

ommended by the engine manufacturer, commercially designated as “Type 2-D” grade diesel fuel, shall be used: (b)(4) through (g) [Reserved]. For guidance see § 86.113–94.

Item		ASTM test method No.	Type 2–D
(i) Cetane Number		D613	38–58
(ii) Cetane Index		D976	min. 40
(iii) Distillation range:			
90 pct. point	°F	D86	540–630
(iv) Gravity	°API	D287	30–39
(v) Total sulfur	ppm	D2622	7–15
(vi) Flashpoint, min.	°F	D93	130
	(°C)		(54.4)
(vii) Viscosity	centistokes	D445	1.5–4.5

(h)(1) For model year 2004 through 2006 Tier 2 diesel-fueled vehicles that incorporate sulfur-sensitive technologies, the manufacturer may test the vehicle using a test fuel meeting the specifications listed in paragraphs (b)(2) and (b)(3) of this section, provided the manufacturer clearly recommends to the ultimate purchaser in the owner’s manual that the vehicle should use fuel with no higher than 15 ppm sulfur.

(2) For model year 2004 through 2006 Tier 2 diesel-fueled vehicles that incorporate sulfur-sensitive technologies and that are certified for 50-state sale (*i.e.*, certified to California and EPA standards), the manufacturer may test the vehicle using a test fuel whose

qualities, on a specification by specification basis, meet the requirements of either the specifications listed in paragraph (b)(2) of this section or the California test fuel specifications, provided the manufacturer clearly recommends to the ultimate purchaser in the owner’s manual that the vehicle should use fuel with no higher than 15 ppm sulfur.

(3) Where a manufacturer uses a test fuel under paragraph (h)(1) or (h)(2) of this section, EPA shall use the same fuel for its compliance testing.

[66 FR 5167, Jan. 18, 2001]

§ 86.113–94 Fuel specifications.

(a) *Gasoline fuel.* (1) Gasoline having the following specifications will be

Environmental Protection Agency

§ 86.113–94

used by the Administrator in exhaust and evaporative emission testing of petroleum-fueled Otto-cycle vehicles. Gasoline having the following specification or substantially equivalent specifications approved by the Administrator, shall be used by the manufacturer in exhaust and evaporative testing except that octane specifications do not apply;

Item	ASTM test method No.	Value
Octane, Research, Min	D2699	93
Sensitivity, Min		7.5
Lead (organic):		
g/U.S. gal. (g/liter)	D3237	¹ 0.050 ¹ (0.013)
Distillation Range:		
IBP: ² °F (°C)	D86	75–95 (23.9–35)
10 pct. point: °F (°C)	D86	120–135 (48.9–57.2)
50 pct. point: °F (°C)	D86	200–230 (93.3–110)
90 pct. point: °F (°C)	D86	300–325
(148.9–162.8):		
EP, max: °F (°C)	D86	415 (212.8)
Sulfur, weight pct. max	D1266	0.10
Phosphorus, max. g/U.S. gal. (g/liter)	D3231	0.005 (0.0013)
RVP, ^{3,4} psi (kPa)	D3231	8.7–9.2 (60.0–63.4)
Hydrocarbon composition:		
Olefins, max. pct	D1319	10
Aromatics, max. pct	D1319	35
Saturates	D1319	(⁵)

¹ Maximum.

² For testing at altitudes above 1,219 m (4,000 ft), the specified range is 75°–105 °F (23.9°–40.6 °C).

³ For testing which is unrelated to evaporative emission control, the specified range is 8.0–9.2 psi (55.2–63.4 kPa).

⁴ For testing at altitudes above 1,219 m (4,000 ft), the specified range is 7.6–8.0 psi (52–55 kPa).

⁵ Remainder.

(2)(i) Unleaded gasoline representative of commercial gasoline which will be generally available through retail outlets shall be used in service accu-

mulation. Leaded gasoline will not be used in service accumulation.

(ii) The octane rating of the gasoline used shall be no higher than 1.0 Research octane number above the minimum recommended by the manufacturer and have a minimum sensitivity of 7.5 octane numbers, where sensitivity is defined as the Research octane number minus the Motor octane number.

(iii) The Reid Vapor Pressure of the gasoline used shall be characteristic of the motor fuel used during the season in which the service accumulation takes place.

(3) The specification range of the gasoline to be used under this paragraph (a) shall be reported in accordance with § 86.094–21(b)(3) or § 86.1844–01 as applicable.

(b) *Petroleum diesel test fuel.* (1) The petroleum fuels employed for testing diesel vehicles shall be clean and bright, with pour and cloud points adequate for operability. The petroleum diesel fuel may contain nonmetallic additives as follows: Cetane improver, metal deactivator, antioxidant, dehazer, antirust, pour depressant, dye, dispersant and biocide. Fuels specified for emissions testing are intended to be representative of commercially available in-use fuels.

(2) Petroleum fuel for diesel vehicles meeting the following specifications, or substantially equivalent specifications approved by the Administrator, shall be used in exhaust emission testing. The grade of petroleum diesel fuel recommended by the engine manufacturer, commercially designated as “Type 2–D” grade diesel, shall be used:

Item		ASTM test method No.	Type 2–D
Cetane number		D 613	40–50
Cetane index		D 976	40–50
Distillation range:			
IBP	°F	D 86	340–400
	(°C)		(171.1–204.4)
10 pct. point	°F	D 86	400–460
	(°C)		(204.4–237.8)
50 pct. point	°F	D 86	470–540
	(°C)		(243.3–282.2)
90 pct. point	°F	D 86	560–630
	(°C)		(293.3–332.2)
EP	°F	D 86	610–690
	(°C)		(321.1–365.6)
Gravity	°API	D 287	32–37
Total sulfur	pct.	D 2622	0.03–0.05

Item		ASTM test method No.	Type 2–D
Hydrocarbon composition:			
Aromatics, minimum	pct.	D 1319	27
Paraffins, Naphthenes, Olefins		D 1319	¹
Flashpoint, min.	°F	D 93	130
	(°C)		(54.4)
Viscosity	centistokes	D 445	2.0–3.2

[¹] Remainder.

(3) Petroleum fuel for diesel vehicles meeting the following specifications, or substantially equivalent specifications approved by the Administrator, shall be used in service accumulation.

The grade of petroleum diesel fuel recommended by the engine manufacturer, commercially designated as “Type 2–D” grade diesel fuel, shall be used:

Item		ASTM test method No.	Type 2–D
Cetane Number		D613	38–58
Cetane Index		D976	min. 40
Distillation range:			
90 pct. point	°F	D86	540–630
	(°C)		(282.2–343.3)
Gravity	°API	D287	30–39
Total sulfur	pct.	D2622	0.03–0.05
Flashpoint, min.	°F	D93	130
	(°C)		(54.4)
Viscosity	centistokes	D445	1.5–4.5

(4) Other petroleum distillate fuels may be used for testing and service accumulation provided:

(i) They are commercially available; and

(ii) Information, acceptable to the Administrator, is provided to show that only the designated fuel would be used in customer service; and

(iii) Use of a fuel listed under paragraphs (b)(2) and (b)(3) of this section would have a detrimental effect on emissions or durability; and

(iv) Written approval from the Administrator of the fuel specifications is provided prior to the start of testing.

(5) The specification range of the fuels to be used under paragraphs (b)(2), (b)(3) and (b)(4) of this section shall be reported in accordance with § 86.094–21(b)(3) or § 86.1844–01 as applicable.

(c) *Methanol fuel.* (1) Methanol fuel used for exhaust and evaporative emission testing and in service accumulation shall be representative of commercially available methanol fuel and shall consist of at least 50 percent methanol by volume.

(i) Manufacturers shall recommend the methanol fuel to be used for testing and service accumulation.

(ii) The Administrator shall determine the methanol fuel to be used for testing and service accumulation.

(2) Other methanol fuels may be used for testing and service accumulation provided:

(i) They are commercially available; and

(ii) Information, acceptable to the Administrator, is provided to show that only the designated fuel would be used in customer service; and

(iii) Use of a fuel listed under paragraph (c)(1) of this section would have a detrimental effect on emissions or durability; and

(iv) Written approval from the Administrator of the fuel specifications must be provided prior to the start of testing.

(3) The specification range of the fuels to be used under paragraphs (c)(1) and (c)(2) of this section shall be reported in accordance with § 86.094–21(b)(3) or § 86.1844–01 as applicable.

(d) *Mixtures of petroleum and methanol fuels for flexible fuel vehicles.* (1) Mixtures of petroleum and methanol fuels

Environmental Protection Agency

§ 86.113-94

used for exhaust and evaporative emission testing and service accumulation for flexible fuel vehicles shall consist of the appropriate petroleum fuels listed in either paragraph (a) or paragraph (b) of this section and a methanol fuel representative of the fuel expected to be found in use, as specified in paragraph (c) of this section, and shall be within the range of fuel mixtures for which the vehicle was designed, as reported in § 86.94-21(j) or § 86.1844-01 as applicable. The Administrator may use any fuel or fuel mixture within this range for testing.

(2) The fuel mixtures used by the manufacturers shall be sufficient to demonstrate compliance over the full design range, and shall include:

(i) For emission testing:

(A) The petroleum fuel specified in paragraph (a) or (b) of this section;

(B) A methanol fuel representative of the methanol fuel expected to the found in use, as specified in paragraph (c) of this section;

(C) A combination of the fuels specified in paragraphs (d)(2)(i)(A) and (d)(2)(i)(B) of this section at a composition which represents the highest Reid Vapor Pressure of in-use mixtures. This mixture shall contain between 9-13 percent methanol by volume.

(ii) For service accumulation, the fuels specified in paragraphs (a) and (c) of this section or, for diesel FFVs, paragraphs (b) and (c) of this section shall be used alternately. The fuels shall be alternated at mileage intervals not to exceed 5,000 miles. The fuels shall be alternated such that the cumulative volumes of both the methanol fuel and the petroleum fuel used shall be at least 25 percent of the total fuel volume.

(iii) Or, other combinations for testing or service accumulation which demonstrate compliance with the standards over the entire design range of the vehicle, provided that written approval is obtained from the Administrator prior to the start of testing.

(3) The specification range of the fuels to be used under this paragraph shall be reported in accordance with § 86.094-21(b)(3) or § 86.1844-01 as applicable.

(e) *Natural gas fuel.* (1) Natural gas fuel having the following specifications

will be used by the Administrator for exhaust and evaporative emission testing of natural gas-fueled vehicles:

Item		ASTM test method No.	Value
Methane	min. mole pct.	D1945	89.0
Ethane	max. mole pct.	D1945	4.5
C ₃ and higher	max. mole pct.	D1945	2.3
C ₄ and higher	max. mole pct.	D1945	0.2
Oxygen	max. mole pct.	D1945	0.6
Inert gases:			
Sum of CO ₂ and N ₂	max. mole pct.	D1945	4.0
Odorant ¹			

¹ The natural gas at ambient conditions must have a distinctive odor potent enough for its presence to be detected down to a concentration in air of not over 1/5 (one-fifth) of the lower limit of flammability.

(2) Natural gas representative of commercially available natural gas fuel which will be generally available through retail outlets shall be used in service accumulation for natural gas-fueled vehicles.

(3) Other natural gas fuels may be used for testing and service accumulation provided:

(i) They are commercially available; and

(ii) Information acceptable to the Administrator is provided to show that only the designated fuel would be used in customer service; and

(iii) Written approval from the Administrator of the fuel specifications must be provided prior to the start of testing.

(4) The specification range of the fuels to be used under paragraphs (e)(1), (e)(2) and (e)(3) of this section shall be reported in accordance with § 86.094-21(b)(3) or § 86.1844-01 as applicable.

(f) *Liquefied petroleum gas fuel.* (1) Liquefied petroleum gas fuel used for exhaust and evaporative emission testing and in service accumulation shall be commercially available liquefied petroleum gas fuel.

(i) Manufacturers shall recommend the liquefied petroleum gas fuel to be used for testing and service accumulation.

(ii) The Administrator shall determine the liquefied petroleum gas fuel to be used for testing and service accumulation.

(2) Other liquefied petroleum gas fuels may be used for testing and service accumulation provided:

(i) They are commercially available; and

(ii) Information, acceptable to the Administrator, is provided to show that only the designated fuel would be used in customer service; and

(iii) Written approval from the Administrator of the fuel specifications must be provided prior to the start of testing.

(3) The specification range of the fuel to be used under paragraphs (f)(1) and (f)(2) of this section shall be measured in accordance with ASTM D2163-61 (Incorporated by reference; see § 86.1) and reported in accordance with § 86.094-21(b)(3) or § 86.1844-01 as applicable.

(g) Fuels not meeting the specifications set forth in this section may be used only with the advance approval of the Administrator.

[59 FR 48506, Sept. 21, 1994, as amended at 60 FR 34342, June 30, 1995; 62 FR 47120, Sept. 5, 1997; 63 FR 24448, May 4, 1998; 64 FR 23921, May 4, 1999; 65 FR 8277, Feb. 18, 2000]

§ 86.114-94 Analytical gases.

(a) *Analyzer gases.* (1) Gases for the CO and CO₂ analyzers shall be single blends of CO and CO₂ respectively using nitrogen as the diluent.

(2) Gases for the THC analyzer shall be:

(i) Single blends of propane using air as the diluent; and

(ii) Optionally, for response factor determination, single blends of methanol using air as the diluent.

(3) Gases for the methane analyzer shall be single blends of methane using air as the diluent.

(4) Gases for the NO_x analyzer shall be single blends of NO named as NO_x, with a maximum NO₂ concentration of 5 percent of the nominal value, using nitrogen as the diluent.

(5) Fuel for FIDs and HFIDs and the methane analyzer shall be a blend of 40 ±2 percent hydrogen with the balance being helium. The mixture shall contain less than one ppm equivalent carbon response. 98 to 100 percent hydrogen fuel may be used with advance approval by the Administrator.

(6) The allowable zero gas (air or nitrogen) impurity concentrations shall not exceed 1 ppm equivalent carbon response, 1 ppm carbon monoxide, 0.04

percent (400 ppm) carbon dioxide, and 0.1 ppm nitric oxide.

(7) "Zero grade air" includes artificial "air" consisting of a blend of nitrogen and oxygen with oxygen concentrations between 18 and 21 mole percent.

(8) The use of precision blending devices (gas dividers) to obtain the required calibration, as defined below, is acceptable, provided that the calibration curves they produce name a calibration gas within 2 percent of its certified concentration. This verification shall be performed at between 15 and 50 percent of the full scale concentration of the range and shall be included with each gas calibration incorporating a blending device. Alternative procedures to verify the validity of the analyzer calibration curves generated using a gas divider are acceptable provided the procedures are approved in advance by the Administrator.

(b) Calibration gases (not including methanol) shall be traceable to within one percent of NIST (formerly NBS) gas standards, or other gas standards which have been approved by the Administrator.

(c) Span gases (not including methanol) shall be accurate to within two percent of true concentration, where true concentration refers to NIST (formerly NBS) gas standards, or other gas standards which have been approved by the Administrator.

(d) Methanol in air gases used for response factor determination shall:

(1) Be traceable to within ±2 percent of NIST (formerly NBS) gas standards, or other standards which have been approved by the Administrator; and

(2) Remain within ±2 percent of the labeled concentration. Demonstration of stability shall be based on a quarterly measurement procedure with a precision of ±2 percent (two standard deviations), or other method approved by the Administrator. The measurement procedure may incorporate multiple measurements. If the true concentration of the gas changes by more than two percent, but less than ten percent, the gas may be relabeled with the new concentration.

[56 FR 25773, June 5, 1991, as amended at 60 FR 34342, June 30, 1995]